CMSE222 - Introduction to Computer Organization

Department: Software Engineering

Instructor information
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Program Name: Computer Engineering	**Program Code:** 25	
Course Number: CMSE222	**Credits:** 4 Cr	**Year/Semester:** 2019-2020/ Spring

☒ Required Course ☐ Elective Course

Prerequisite(s):
MATH163 Discrete Mathematics

Catalog description:
Numbering systems, Boolean Algebra, Simplification of Boolean functions. Combinatorial logic. Synchronous sequential logic, registers, and counters. Machine language instructions: the MIPS approach. The processing unit design: data path and control.

Course web page:
http://cmpe.emu.edu.tr/courses/cmse222

Textbook(s):
J. F. Weakerly, "*Digital Design: Principles and Practices*", Prentice-Hall, 2006
D.A. Patterson and J.L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5th, Morgan Kaufmann, 2014. (ISBN: 978-0-12-374750-1).

Indicative basic reading list :
1. S. Brown and Z. Vranesic, "Fundamentals of Digital Logic with VHDL Design", McGraw-Hill, 2009
2. Richard S. Sandige, "*Digital Design Essentials*," Prentice-Hall 2002.
3. Computer Architecture: A Quantitative approach, J.L. Hennessy and D.A. Patterson, 3rd Ed., Morgan Kaufmann, 2003.

Topics covered:

1	Numbering systems
2	Boolean Algebra, Boolean function, Simplification of Boolean functions, K-map.
3	Combinatorial logic circuits analysis and design
4	Introduction to synchronous sequential logic, registers, Memory.
5	Introduction to computer organization
6	Introduction to MIPS assembly language, Machine language instructions.
7	Introduction to processing unit design: data path and control (single cycle approach).

Laboratory schedule (tentative, 2 hours of laboratory per week)

1	Intro. Quartus II Design Environment & A Review Of VHDL Basics
2	Intro. Quartus II Design Environment: Compiling And Simulating The Schematic Entry
3	Basic VHDL Prog. Of Combinational Circuits.
4	VHDL implementation of registers and counters.
7	Introduction to PCSpim (MIPS R2000 Simulator
8	Memory Referenced MIPS Instructions Used In Accessing The Arrays
9	Single Clock Data Path for 16-bit R-type Instructions in ALTERA MAX-PLUS-II VHDL Environment.

Course learning outcomes:
Upon successful completion of the course, students are expected to have the following competencies:
1. Use binary, octal, and hexadecimal number systems
2. Use algebraic manipulations as well as K-map to build and evaluate Boolean expressions and functions.
3. Analyze and design combinational circuits and find their functions.
4. Understand the difference between Combinational logic circuit and synchronous sequential logic.
5. Understand the concept of latch memory, flip-flop, registers, Memory.
6. Study the fundamentals of computer instruction set architecture, including machine-level instruction formats and addressing modes
7. Describe the difference between RISC and CISC instruction sets

8. Ability to write, to encode, and to run a simple assembler program on a MIPS processor.
9. Perform the basic structure and organization of a MIPS processor data-path (single cycle approach).

Assessment (tentative)	**Method**		**Percentage**
	Midterm Exam		30%
	Final Examination		40%
	Quiz and/or HW		20%
	Lab		10%

Policy on makeup: There is no makeup for quizzes. Only one makeup exam can be given for one of the missed exams (midterm or final). In order to be able to enter a makeup exam, you MUST submit a written report to your instructor stating your excuse within 3 days of that examination.

Policy on cheating and plagiarism: Any student caught cheating at the exams or assignments will automatically fail the course and may be sent to the disciplinary committee at the discretion of the instructor.

Policy on NG grades: NG grade will be given in the following cases:
Lab attendance < 50% or Missing any exam without an acceptable excuse.

Contribution of course to ABET criterion 5
Credit Hours for:
Mathematics & Basic Science : 0
Engineering Sciences and Design : 4
General Education : 0

Relationship of the course to program outcomes
The course has been designed to contribute to the following program outcomes:
1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Prepared by: Prof. Dr. Omar Ramadan	**Date Prepared:** Feb. 17th 2020